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Changes of The Epidemiologic Competences after Introductory Course of The Korea - Field Epidemiologist Training Program(K-FETP) in Epidemiologic Intelligence Servise(EIS) Officers

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한국 역학조사관 기본교육(K-FETP) 전후 역량 평가

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= Abstract =

목적: 이 연구는 2019학년도 역학조사관 입문교육 과정에 참여한 29명의 수습과정생에게 참여형 자기주도 학습 역학조사관 연수 프로그램(FETP)의 효과와 만족도 등 역량 변화를 분석해 그 결과를 향후 과정 개발의 참고 자료로 활용하고자 하였다.

방법: 교육 프로그램의 만족도와 교육 후 모듈에 대한 역량 변화를 평가하는 연구가 수행되었다. 만족도와 역량의 차이 비교는 크루스칼 왈리스 검정(Kruskal-Wallis test)를 실시하였고, 역량의 차이는 윌콕슨 부호순위검정(Wilcoxon signed rank test)에 의해 이루어 졌다.

결과: 2019년 FETP에 참여한 역학조사관 중 여성은 48.3% 였으며, 40세 미만은 9.4% 였다. 역학조사관 입문교육과정 모듈(역학조사, 보건통계 및 정보통계, 감염병 국가 체계, 감염병 질환 감시 체계, 진단 및 실험실 검사, 생물 안전 및 관리, 주요 감염성질환 관리와 조사, 커뮤니케이션, 협동과 리더십, 일반과정)별 만족도는 실무적 도움, 전문성, 기능, 태도 등에서 4점(5점 만점)을 초과하였고, 전체 4.2±0.21(5점 만점)점으로 높은 수준이였다, 모듈의 교육훈련 전후 평균 점수는 2.25±0.91, 3.68±0.63점 등으로 유의한 향상이 있었으며, 모든 모듈 및 하위 주제들도 유의한 향상이 있었다($p<0.001$). 그 중에서 현장역학조사 경험이 가장 높은 변화가 있었고, 표본 수집과 실무가 가장 낮은 역량 변화가 있었다.

결론: 2019년 진행된 입문교육 과정은 수료 후 학생들의 역량은 개선되었고, 만족도는 높은 편이었다. 참여형 자기주도학습의 촉진은 역량을 향상시킬 뿐만 아니라 보건 종사자들의 자신감을 높일 수 있었다.

키워드: 역학조사관, FETP, 만족도, 역량

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Introduction

It is important to monitor the occurrence of infectious diseases and conduct rapid epidemiological investigation that readily identifies infectious agents and infection routes in the early stages in an outbreak, to prepare and respond promptly to newly emerging infectious diseases.

As such, clinical and practical knowledge of infectious diseases as well as the roles of professional personnel to conduct epidemiological investigation in the event of an outbreak are very vital [1]. To this regard, many countries around the world adapt EIS (Epidemiology Intelligence Service Officer) training programs from the United States Field Epidemiology Training Program (FETP) which is a training program that nurtures personnel with specific goals [2].

Beginning with a pilot project in 1999, Korea facilitated the Epidemiologist Training Program by introducing an epidemiological system [3]. By 2015, public health doctors who were interested in epidemiology and infectious diseases were selected to receive professional training on infectious diseases management and dynamics; furthermore, they were assigned to the Korea Centers for Disease Control and Prevention, cities and provinces to obtain necessary training and carry out infectious disease operation for two years [1, 3, 4]. However, it was pointed out that EIS officers lack continuity expertise due to decrease in the number of public health practitioners, their return to the private sector after the mandatory military service and no linkage to the relevant field after completing the training [5,6]. After the Middle East Respiratory Syndrome (MERS) epidemic in 2015, the law was revised to hire private experts as epidemiological investigators; sequentially the Korea Centers for Disease Control and Prevention changed the hiring requirement of epidemiologists from public health doctors to open position. The municipal government appointed internal personnel as epidemiologists or hired public health doctors according to the specific needs and conditions of each local government [7].

Therefore, it is necessary to assess the effectiveness of the training program and examine its various aspects [8]. The purpose of this study was to analyze the effects of the training programs on EIS officers who had participated in the introductory training course of Korea Field Epidemiologist Training Program in 2019 and use the results obtained as reference materials for future curriculum development. Competency refers to the total knowledge, skills, and attitudes required to achieve the mission and strategy of the organization and create a desirable organizational culture, as well as the ability of the members to achieve the qualitative performance or goal of the job in the organizational environment. Therefore, the hypothesis of this study is that the participatory self-directed learning dynamics Field Epidemiologist training program (FETP program) would lead to a positive competency change.

Materials and methods

1. Design

Experimental study was carried out evaluating the level of satisfaction gained from the training program and the subject competencies in the modules of the introductory course. The level of satisfaction was measured through

'One shot design' of evaluating the level of satisfaction for lectures and instructors in the curriculum after the courses. The evaluation of the subject competencies was done using the 'One group pretest-posttest design' for checking the change after the courses.

2. Modules and subjects of the introductory training course

The introductory training course consisted of 10 modules and 47 subjects. The 'Epidemiological Investigation' module was made up of 9 subjects (22 hours), the 'Health Statistics and Information System' module had 3 subjects (12 hours), the 'National Management System of the Infectious Disease' module had 6 subjects (7 hours), the 'Surveillance System of the Infectious Disease' module was 3 subjects (5 hours), the 'Diagnosis and Laboratory Test' was 4 subjects (9 hours), 'Management of Life Safety' was 4 subjects (9 hours), 'Management and Investigation of the main infectious disease' was 9 subjects (37 hours), 'Communication' was 3 subjects (10 hours), 'Collaboration and Leadership' was 4 subjects (9 hours), and the 'General Course' module was 4 subjects (4 hours). The courses were implemented mainly through the instructor-led method. 'Health Statistics and Information System', 'Management of Life Safety', 'Communication', and 'Diagnosis and Laboratory Test' were executed in practice. 'Management and Investigation of the main Infectious Disease' was done by lecture and discussion (Table 1).

Table 1. Modules and subjects of the introductory training course in K-FETP

Modules and subjects	Time(hours)	Formula
Epidemiological investigation	22	
Epidemiology and control of the communicable diseases	2	Lecture
Measurement of diseases	2	Lecture
Causal inference and epidemiological research	1	Lecture
Study design for epidemiological investigation	5	Lecture
Analysis methods for epidemiological study	3	Lecture
Methodology for epidemiological investigation of outbreak	4	Lecture
Epidemiological hypothesis test	2	Lecture
Outline of public epidemiological investigation	1	Lecture
Experience of field epidemiological investigation	2	Lecture
Health statistics and information system	12	
Practice of descriptive statistics	4	Lecture, Practicum
Practice of analytic statistics	4	Lecture, Practicum
Practice for data processing for epidemiological investigation	4	Lecture, Practicum
National management system for the communicable diseases	7	
Introduction of EIS officer system in Korea	1	Lecture
Laws and regulations for the communicable diseases	1	Lecture
National management system for the communicable diseases	2	Lecture
Preparedness and responses system to public health crisis	1	Lecture
Preparedness and responses system to emerging diseases	1	Lecture
Introduction of the Emergency Operation Center	1	Tour

Surveillance system of the communicable disease	5		
Surveillance system of the communicable disease in Korea		1	Lecture
Rapid risk assessment and sharing information on public health events		1	Lecture
Surveillance on the communicable and accuracy analysis		3	Lecture
Diagnosis and laboratory test	9		
Microbiology		2	Lecture
Specimen collection and practicum		3	Lecture, Practicum
Laboratory test of clinical specimen		2	Lecture
Understanding of microbial diagnosis in outbreak field		2	Practicum
Biosafety and management	9		
Prevention of infection and PPE		2	Lecture, Practicum
Practice of putting on and off of personal protective equipment		2	Lecture, Practicum
Practice of putting on and off of personal protective equipment (C, D and PAPR)		2	Lecture, Practicum
Practice of putting on and off of personal protective equipment (A, C)		3	Lecture, Practicum
Management and investigation of the major communicable disease	37		
Course Work Training 1_Emerging diseases		8	Lecture, Discussion
Course Work Training 2_Foodborne diseases		8	Lecture, Discussion
Course Work Training 3_Vector-Borne diseases		3	Lecture, Discussion
Course Work Training 4_respiratory diseases		5	Lecture, Discussion
Course Work Training 5_Healthcare-associated infectious diseases		5	Lecture, Discussion
Epidemiological investigation of tuberculosis		3	Lecture
Epidemiological Investigation of tuberculosis and simulation training		2	Lecture, Discussion
Respiratory infectious diseases of vaccine preventable diseases		1	Lecture
Adverse events and reactions after vaccination		2	Lecture
Communication	10		
Interview skill and practice		4	Lecture, Practicum
How to write the report		2	Lecture, Practicum
Method of writing press release and practice		4	Lecture, Practicum
Collaboration and leadership	9		
International Health Regulation		1	Lecture
International collaboration		1	Lecture
Meeting with experienced field epidemiologists		5	Discussion
Communication for conflict resolution and healing		2	Lecture, Discussion
General course	4		
History of the communicable diseases		2	Lecture
General administration		2	Lecture
Lecture on administrative measures	13		
Summative evaluation(examination)		8	Test
Enrollment, feedback, completion, etc		5	
Total 47 subjects(except lecture on adminstrative measures)		220	

The training program consisted of 136 hours in total, 123 hours for ten educational modules, an 8-hour global evaluation, and 5-hour administrative duties such as entrance and completion ceremonies. The introductory course of the epidemiologist as the centralized training was implemented for 30 days from June 5, 2019 to July 5, 2019. The students gained the fundamental competences of the epidemiologist in a step-by-step manner. The educational methods were instructor-led training, practice-based training for the acquisition of skills, and discussion-based training in which students could participate in problem solving.

3. Materials

This study was conducted with the 29 people who participated in the introductory training course of the Field Epidemiology Training program from June 5, 2019 to July 5, 2019. These people work on epidemiological investigation or infectious disease management in the Korea Centers for Disease Control and communicable disease centers. Originally, there were 30 people who registered but one dropped out.

4. Measurement

A questionnaire was administered to the participants. Demographic characteristics were assessed using 5 questions including sex, age, study major, present place of work and career of the epidemiological investigation. Lecture satisfaction for level was evaluated through 4 questions including 'Helpfulness', 'Professionality', 'Skill' and 'Attitude'. Each question was designed using the Likert-type scale, a 5-point scale that ranged from one extreme attitude to another with the high point meaning a high level of the satisfaction. Evaluation of competencies was a self-assessment of the subjects in the modules of the training courses before and after the courses. Similarly, a Likert-type scale was used with the high point meaning high competency for each subject.

5. Data Collection

The satisfaction research was conducted at the end of training for each subject and the evaluation of competencies for each subject was implemented before(5 June, 2019) and after(5 July, 2019) the training course. Korea's Human Resource Development Institute for Health and Welfare - which was in charge of the training -collected the data. It distributed and retrieved the questionnaires from the participants. Cronbaha's alpha of the satisfaction questionnaire was 0.970. Cronbach's alpha of competency questionnaire for pre-evaluation was 0.970, and Cronbach's alpha for post evaluation was 0.969. Competency questionnaires were developed by the researchers. The competency questionnaire was produced on a Likert 5-point scale. All participants completed them before and after the training. Our study was approved by the Konyang university institutional ethical review board (KYU-2021-357-02).

6. Statistical Analysis

The data was analyzed using the statistical analysis tool SPSS 19.0. For evaluation of competencies, data from 29 people were analyzed because they completed the survey before and after the course. Satisfaction was also calculated. The difference in satisfaction according to modules was determined by Kruskal-Wallis test, while the differences in competency evaluation was analyzed by the Wilcoxon signed rank test. Statistical significance level was set at $p < 0.05$.

Results

1. General characteristic of the subjects

Amongst the 29 participants included, 15 were men (51.7%) while 14 were women (43.8%). Four of the participants (13.8%) were in their twenties, seventeen (58.6%) in their thirties, and eight participants (27.6%) were over forty.

Sixteen subjects (55.2%) studied medicine – thirteen of them (44.8%) worked in Korea Centers for Disease Control and the local government; three of them (10.4%) worked in communicable disease centers. Eight subjects (27.6%) studied nursing and health sciences, and five subjects (17.2%) studied unrelated field.

According to the reports 12 of the participants (41.4%) had no experience in epidemiological investigation and they accounted for the largest portion of the subjects. Seven people (24.1%) had a 5 years or less working experience with epidemiological investigations while 3 people (10.3%) had more than 5 years of working experience (Table 1).

2. Evaluation of satisfaction

In the overall level of satisfaction out of a maximum of 5 points, 'Helpfulness' was rated 4.27±0.21, 'Professionalism' was rated 4.30±0.22, 'Skill' was rated 4.23±0.24, and 'Attitude' was rated 4.36±0.19. Based on satisfaction by module, 'Epidemiological Investigation' was the highest in 'Helpfulness' with a value of 4.46±0.12, 'Knowledge' in 'Professionalism' was 4.59±0.05, 'Health Statistics and Information System' in 'Skills' was 4.44±0.18, and 'Attitude' was 4.56±0.11.

For the lowest satisfaction rating by module, 'National Management System of the Infectious Disease' was the lowest with 'Helpfulness' being 4.10±0.15, 'Professionalism' was 4.17±0.15, and 'Skill' was 4.05±0.19. 'Monitoring System of the Infectious Disease' showed the lowest satisfaction in 'Professionalism' with a value of 4.17±0.15 and 'Communication' with an 'Attitude' value of 4.19±0.31 (Table 3).

Table 2. The general characteristics of the subjects

Variables	Class	N	%
Gender	Men	15	51.7
	Women	14	48.3
Age(years)	20-29	4	13.8
	30-39	17	58.6
	≥40	8	27.6
Department	Korea Centers for Disease Control & Prevention	13	44.8
	Provincial or local governments	13	44.8
	Regional communicable disease centers	3	10.4
Major	Medicine	16	55.2
	Nursing and health sciences	8	27.6
	Others	5	17.2
Career in epidemiological investigation	No experience	12	41.4
	< 1 year	7	24.1
	≥1 year and < 5 years	7	24.1
	≥5 years	3	10.3
	Total	29	100

Table 3. Satisfaction on the lectures according to modules and subjects of the introductory training course

Module	Total			Practical helpfulness			Professionalism			Skill			Attitude		
	Mean ± SD	Min	Max	Mean ± SD	Min	Max	Mean ± SD	Min	Max	Mean ± SD	Min	Max	Mean ± SD	Min	Max
Total	4.29 ± 0.21	3.83	4.64	4.27 ± 0.22	3.85	4.69	4.30 ± 0.23	3.85	4.69	4.23 ± 0.24	3.65	4.68	4.36 ± 0.19	3.92	4.65
Epidemiological investigation	4.49 ± 1.73	4.25	4.64	4.46 ± 0.12	4.23	4.69	4.48 ± 0.20	4.05	4.69	4.42 ± 0.14	4.15	4.62	4.49 ± 0.08	4.31	4.58
Health statistics and information system	4.14 ± 1.64	3.93	4.33	4.44 ± 0.29	4.12	4.69	4.53 ± 0.12	4.40	4.62	4.44 ± 0.18	4.24	4.58	4.56 ± 0.11	4.44	4.65
National management system of the communicable diseases	4.18 ± 0.17	4.03	4.37	4.10 ± 0.15	3.85	4.23	4.17 ± 0.17	3.92	4.38	4.05 ± 0.19	3.81	4.23	4.25 ± 0.19	4.00	4.46
Surveillance system for the communicable diseases	4.24 ± 0.23	3.93	4.41	4.17 ± 0.23	4.00	4.44	4.17 ± 0.15	4.00	4.28	4.06 ± 0.24	3.85	4.32	4.31 ± 0.11	4.23	4.44
Diagnosis and laboratory test	4.21 ± 0.11	4.06	4.32	4.18 ± 0.24	3.88	4.38	4.26 ± 0.21	3.96	4.42	4.21 ± 0.26	3.85	4.42	4.33 ± 0.20	4.04	4.46
Biosafety and management	4.19 ± 0.21	3.83	4.47	4.21 ± 0.09	4.08	4.27	4.19 ± 0.17	3.96	4.35	4.15 ± 0.11	4.00	4.27	4.30 ± 0.09	4.19	4.38
Management and investigation of the major communicable diseases	4.17 ± 0.32	3.91	4.52	4.20 ± 0.20	3.88	4.50	4.18 ± 0.23	3.85	4.50	4.14 ± 0.25	3.65	4.42	4.23 ± 0.19	3.92	4.50
Communication	4.39 ± 0.18	4.22	4.63	4.14 ± 0.31	3.92	4.50	4.22 ± 0.29	3.96	4.54	4.12 ± 0.35	3.81	4.50	4.19 ± 0.31	3.96	4.54
Collaboration and leadership	4.45 ± 0.12	4.37	4.54	4.33 ± 0.18	4.15	4.59	4.39 ± 0.19	4.21	4.59	4.36 ± 0.24	4.15	4.68	4.49 ± 0.15	4.35	4.64
General course	4.29 ± 0.21	3.83	4.64	4.37 ± 0.19	4.23	4.50	4.59 ± 0.05	4.55	4.62	4.33 ± 0.25	4.15	4.50	4.53 ± 0.10	4.46	4.60
p-value*	0.014			0.031			0.011			0.040			0.007		

* by Kuruskal-Wallis test

3. Evaluation of competencies

The evaluation of competencies as an index for the course effectiveness was done before and after the training. Results showed that the average score of the competencies was 2.25±0.91 out of 5.0 before the training and it increased to 3.68±0.63 and this increase was statistically significant ($p<0.001$). The 'Field Epidemiological Case Experience' showed the highest change before and after the training program. The course with the least change before and after the training was 'Sample Collection and Practicum'.

The bottom 25% courses in pre-training competency score, were 'Field Epidemiological Case Experience' (2.04±1.00), 'International Collaboration and IHR' (2.08±1.06), 'Outline of Public Epidemiological investigation' (2.15±1.08), 'History of Infectious Disease' (2.19±1.13), 'Understanding of Microbial Diagnosis' (2.19±1.17), 'Statistical Analysis

Practice' (2.20±1.02), 'Method of Writing Press Release and Practice' (2.19±1.10), 'Design Method of Epidemiological investigation' (2.19±0.90), 'Administration' (2.19±1.06), and 'Epidemiological Hypothesis Testing' (2.19±1.02).

On the other hand the top 25% courses whose post-training competency scores showed great improvement, were 'Field Epidemiological Case Experience' (1.81±1.23 improvement), 'Epidemiological Hypothesis Testing' (1.62±0.98), 'Analysis Method of Epidemiology Study' (1.62±0.98), 'Outline of Public Epidemiological Investigation' (1.62±1.17), 'Course Work Training' (1.54±1.21), 'Investigation of spreading' (1.54±1.17), 'International Collaboration and IHR' (1.54±1.07), 'Communication for Conflict Resolution and Healing' (1.50±1.07), 'Interview Skill and Practice' (1.50±1.27), 'Epidemiological Investigation of Tuberculosis and Simulation Training' (1.50±1.10) ($p<0.0001$) (Table 4).

Table 4. Changes of epidemiological capacities between pre- and post- Field Epidemiologist Training Program by modules and subjects

Module	Pre	Post	Difference	p-value*
Total	2.25 ± 0.91	3.68 ± 0.63	1.43 ± 0.99	<0.001
Epidemiological investigation	2.25 ± 0.90	3.73 ± 0.66	1.48 ± 1.09	<0.001
Introduction to epidemiology and control of the communicable diseases	2.27 ± 1.04	3.62 ± 0.80	1.35 ± 1.20	<0.001
Measurement of diseases	2.24 ± 0.98	3.64 ± 0.81	1.33 ± 1.20	<0.001
Causal inference and epidemiological research	2.35 ± 1.02	3.65 ± 0.80	1.31 ± 1.23	<0.001
Study design for epidemiological investigation	2.19 ± 0.90	3.65 ± 0.80	1.46 ± 1.17	<0.001
Analysis methods for epidemiological study	2.23 ± 1.11	3.85 ± 0.67	1.62 ± 1.17	<0.001
Methodology for epidemiological investigation of outbreak	2.23 ± 0.99	3.77 ± 0.71	1.54 ± 1.17	<0.001
Epidemiological hypothesis test	2.19 ± 1.02	3.81 ± 0.75	1.62 ± 0.98	<0.001
Outline of public epidemiological investigation	2.15 ± 1.08	3.77 ± 0.76	1.62 ± 1.30	<0.001
Experience of field epidemiological investigation	2.04 ± 1.00	3.85 ± 0.67	1.81 ± 1.23	<0.001
Health statistics and information system	2.31 ± 1.00	3.69 ± 0.59	1.38 ± 1.03	<0.001
Practice of data processing for epidemiological investigation	2.38 ± 1.09	3.73 ± 0.67	1.38 ± 1.19	<0.001
Practice of descriptive statistics	2.20 ± 1.02	3.65 ± 0.68	1.39 ± 1.98	<0.001
Practice of analytic statistics	2.29 ± 1.00	3.69 ± 0.68	1.42 ± 1.14	<0.001
National management system of the communicable diseases	2.36 ± 0.92	3.72 ± 0.68	1.37 ± 0.90	<0.001
Introduction of EIS officer system in Korea	2.35 ± 0.98	3.69 ± 0.84	1.35 ± 1.09	<0.001
Laws and regulations of the communicable diseases	2.35 ± 0.89	3.81 ± 0.75	1.46 ± 0.99	<0.001
National management system for the communicable diseases	2.35 ± 1.09	3.81 ± 0.74	1.35 ± 1.06	<0.001
Preparedness and responses system to public health crisis	2.38 ± 1.02	3.69 ± 0.74	1.31 ± 0.93	<0.001
Preparedness and responses system to emerging diseases	2.35 ± 0.89	3.81 ± 0.75	1.46 ± 0.99	<0.001
Introduction of the Emergency Operation Center	2.35 ± 0.98	3.69 ± 0.84	1.35 ± 1.09	<0.001
Surveillance system of the communicable diseases	2.23 ± 1.13	3.67 ± 0.74	1.44 ± 1.07	<0.001
Surveillance system of the communicable diseases in Korea	2.33 ± 1.18	3.65 ± 0.79	1.42 ± 1.17	<0.001
Rapid risk assessment and sharing information on public health events	2.27 ± 1.19	3.73 ± 0.78	1.46 ± 1.17	<0.001
Surveillance on the communicable diseases and accuracy analysis	2.19 ± 1.17	3.62 ± 0.80	1.42 ± 1.10	<0.001

Diagnosis and laboratory test	2.31 ± 1.22	3.55 ± 0.82	1.24 ± 1.25	<0.001
Microbiology	2.27 ± 1.25	3.54 ± 0.81	1.27 ± 1.31	<0.001
Specimen collection and practicum	2.35 ± 1.26	3.46 ± 0.81	1.12 ± 1.21	<0.001
Laboratory test of clinical specimen	2.27 ± 1.28	3.54 ± 0.86	1.27 ± 1.34	<0.001
Understanding of microbial diagnosis in outbreak field	2.19 ± 1.17	3.58 ± 0.81	1.38 ± 1.20	<0.001
Biosafety and management	2.31 ± 1.01	3.69 ± 0.74	1.38 ± 1.17	<0.001
Prevention of infection and personal protective equipment	2.31 ± 1.01	3.69 ± 0.74	1.38 ± 1.17	<0.001
Management and investigation of the major communicable diseases	2.26 ± 1.00	3.71 ± 0.70	1.45 ± 1.16	<0.001
Course work training	2.27 ± 1.08	3.81 ± 0.69	1.54 ± 1.21	<0.001
Epidemiological investigation of tuberculosis and simulation training	2.23 ± 1.03	3.73 ± 0.72	1.50 ± 1.10	<0.001
Adverse events and reactions after vaccination	2.27 ± 1.00	3.58 ± 0.81	1.31 ± 1.09	<0.001
Communication	2.27 ± 1.11	3.69 ± 0.71	1.42 ± 1.25	<0.001
Interview skill and practice	2.23 ± 1.11	3.73 ± 0.78	1.50 ± 1.27	<0.001
How to write the report	2.31 ± 1.12	3.69 ± 0.74	1.38 ± 1.24	<0.001
Method of writing press release and practice	2.19 ± 1.10	3.62 ± 0.70	1.42 ± 1.24	<0.001
Collaboration and leadership	2.17 ± 1.05	3.68 ± 0.73	1.52 ± 1.07	<0.001
International Health Regulation	2.19 ± 1.10	3.62 ± 0.70	1.42 ± 1.24	<0.001
International collaboration	2.08 ± 1.06	3.62 ± 0.80	1.54 ± 1.07	<0.001
Meeting with experienced field epidemiologists	2.27 ± 1.00	3.58 ± 0.81	1.31 ± 1.09	<0.001
Communication for conflict resolution and healing	2.27 ± 1.04	3.77 ± 0.71	1.50 ± 1.07	<0.001
General course	2.19 ± 1.09	3.61 ± 0.81	1.39 ± 1.21	<0.001
History of the communicable diseases	2.19 ± 1.13	3.54 ± 0.86	1.35 ± 1.20	<0.001
General administration	2.19 ± 1.06	3.65 ± 0.89	1.46 ± 1.27	<0.001

* by Wilcoxon signed rank test

Discussions

Women participants consisted of 48.3% of the overall study participants, depicting an increase of 30.1%, as compared to 18.2% in 2014, and the age group < 40 years, was 72.4% in 2019, a decrease of 9.4% as compared to 81.8% in 2014 [9].

Since 1999, the Korea Centers for Disease Control and Prevention and the government officials have operated the Korea Field Epidemiologist Training Program, which mainly consisted of public health doctors that were replacement of the military personnel, making men and young age groups as the main targets for the training. However, due to the changes in the recruitment system from public health doctors to experts, there has been a rise in the number of female participants that come from professions in the field of nursing or hospital infection control sectors. The Korean Epidemiologist Training Program (K-FETP) consists of a three-week Introductory Course, workshops (once a year), consequent training sessions twice a year (two nights and three days), and a two-year conference of epidemiologists [7].

The main content of the introductory training

course is to acquire basic knowledge and skills on epidemiological and infectious disease management, and it is usually conducted for three weeks after the selection of EIS officers. Originally the training begins from the second quarter of the year and is conducted from mid-April to early May, but due to the increase in the number of participants it has been going on throughout the year. The workshop is held to discuss and improve collaboration among the EIS officers in the epidemiological system. FETP in the U.S. and other foreign countries sees the need to increase their training hours at least now to 9 ~28 weeks while the basic and continuing courses require more time to complete the required training period and provide separate training based on core competencies, which is to be decided primarily by the years of experience [7].

The basic curriculum of the introductory training program from 2011~2015, consisted of six modules of 87~101 hours including epidemiology and statistics of infectious diseases, waterborne and food borne diseases, vaccination target diseases, public health crisis responses, and other infectious diseases, epidemiological surveys and administrative-related lectures, went through major and small changes in curricula according to the changes in infectious disease inside of Korea and abroad 2016. Many countries around the world have their EIS training programs facilitated by the United States or Field Epidemiology Training Program (FETP), a similar training program which nurtures similar personnel [11]. The U.S. Centers for Disease Control and Prevention (CDC) defines Field Epidemiology Training Program (FETP) as "establishment of public health systems capacity to strengthen sustainable health capabilities and a service program for applicable epidemiological and public health education" [12]. The major components of FETP is providing a major health services and training that is competency-based and building systems capacity for the public health. In addition, the purpose of the epidemiological investigator education program presented in the Korea Infectious Diseases Management Project Guidelines states, "We will provide epidemiological investigators with specialized and active epidemiological investigation services in the event of an infectious disease by allowing them to acquire the expertise necessary for improving their performance and managing infectious diseases, provide epidemiological investigators with new knowledge and information related to infectious diseases, and enhance their expertise in epidemiological research field experience through exchange." [12].

In addition, as examined from the Korea Infectious Disease Management project guideline, "providing epidemiological EIS officers with specialized and active epidemiological investigation which will serve in the event of an infectious disease and new knowledge and information related to infectious diseases and enhancing their expertise in epidemiological research field experience through change" are main aims for the epidemiologist training program.

This study had some limitations as belows. Firstly, this study had 29 subjects, however the number of study subjects was very small, and the characteristics such as members' qualifications, licenses, and education levels were all different, so attention was needed to interpret representation and results. Secondly,

because the number of members was small and the qualifications and licenses were different, detailed analysis was not possible, so there was a limitation in interpretation. Thirdly, the point was that the survey timing of satisfaction and competency evaluation may be more accurate in the form of evaluation after time had elapsed after class.

Conclusion

The level of satisfaction of the epidemiologist's introductory curriculum module (dynamic investigation, health statistics and information statistics, infectious disease national system, infectious disease monitoring system, diagnosis and laboratory testing, bio-safety and management, major infectious disease management and investigation, communication, cooperation and leadership, general courses) exceeded 4 points (out of 5) in the practical, expertise, skills, and attitude modules, 4.2±0.21 (out of 5) overall, 3.68±0.63 (out of 5) for each module and there was a significant difference between the content before and after training, and competency ($p<0.001$).

The introductory curriculum conducted in 2019 was effective in enhancing Epidemioloist' capabilities and satisfaction. The promotion of participatory self-directed learning not only improved competency but also increased the confidence of Epidemiologic Intelligence Service officers. In the future, it seems necessary to compare the performance of each curriculum and improve various problems.

Conflict of interest

The authors have no conflicts of interest to declare for this study.

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